Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems Carrier Current Systems, including Broadband over Power Line Systems	ET Docket No. 04-37 ET Docket No. 03-104

Comments of the Intellon Corporation

Intellon Corporation ("Intellon") files these comments in support of the Commission continuing to permit measurement of incidental radiation in frequency bands below 30 MHz using the square of an inverse linear distance extrapolation factor (40 dB/decade).[1] These comments respond to the Commission's Request for Further Comment and Further Notice of Proposed Rulemaking ("Further Notice")[2] on this issue following remand from the U.S. Court of Appeals for the D.C. Circuit.[3] Substantial studies of radiation attenuation factors conducted after the Commission in this proceeding decided to retain the extrapolation factor in its rules[4] validate the technical basis for using the 40 dB/decade factor. Retaining the rule will settle the current

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1 *See* 47 C.F.R. § 15.31(f)(2).

2 *See* Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems, Request for Further Comment and Further Notice of Proposed Rule Making, 24 FCC Rcd 9669 (2009).

3 *American Radio Relay League v. F.C.C.*, 524 F.3d 227 (D.C. Cir. 2008).

4 *See* Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems, Report and Order, 19 FCC Rcd 21265 (2004), reconsideration denied with regard to the extrapolation factor issue, Memorandum Opinion and Order, 21 FCC Rcd 9308 (2006).

uncertainty that exists in industry and unleash new initiatives and investment in BPL and further the Congressional and Commission policies favoring multiple competitive broadband sources and extending broadband access to rural areas.

Description of Intellon's Interest

Intellon Corporation(NASDAQ: ITLN), a fabless semiconductor company, engages in the design, develop, manufacture, and marketing of integrated circuits (ICs) for powerline communications or high-speed communications over existing electrical wiring in the United States and internationally. The company provides HomePlug-based ICs for home networking, networked entertainment, broadband over powerline access, ethernet-over-coax, smart grid management, and other commercial applications. The HomePlug-based ICs provide connectivity between broadband modems or routers and personal computers, set-top boxes, gaming consoles, and other electronic products within a home; and monitors electrical distribution system, as well as helps in distributing Internet, video-on-demand, and other services. It also offers command and control ICs for monitoring anti-lock braking systems in tractor-trailer trucks. Intellon Corporation serves digital home, electric utility, commercial, and automotive markets. It sells its products to original equipment manufacturers primarily through distributors and original design manufacturers. The company was founded in 1989 and is headquartered in Orlando, Florida.

Discussion

Intellon Corporation respectfully requests the Commission to retain its existing rule that permits measuring incidental radiation in frequency bands below 30 MHz using the square of an inverse linear distance extrapolation factor (40 dB/decade). This rule is critical to the development of BPL and, notwithstanding the procedural flaws found by the Court of Appeals, is scientifically based as demonstrated by recent studies. Furthermore, retaining the rule will settle the current

uncertainty that exists in industry and thereby open doors for new initiatives and investment in BPL that will promote the Congressional and Commission policies favoring multiple competitive broadband sources and extending broadband access to rural areas.

The access BPL industry, which includes smart grid, already has attracted substantial investment to provide energy cleanly and efficiently. Changing the regulatory environment without very strong justification would have severe implications for the government's initiative to provide cleaner and greener energy.

Intellon devices already incorporate interference mitigation techniques. In addition, in-home network devices exhibit additional isolation due to attenuation of the structures in which they are located and the characteristics of transformers used in the network.

Intellon therefore requests that the Commission not change its current rule and continue to permit use of the 40 dB per decade extrapolation factor under the same conditions that have applied for many years.

The FCC Staff Studies and Studies Submitted by the ARRL Fail to Justify Changing the Extrapolation Factor

The Court of Appeals and the FCC in the Further Notice discuss five FCC staff studies and four additional studies put in the record by the ARRL as part of an *ex parte* submission during consideration of their reconsideration petition in this proceeding. The U.S. Court of Appeals did not examine these studies or reach any conclusions based upon their technical merits, but rather, sided with the ARRL's arguments that the Commission had an obligation to place in the record its own internal studies upon which it had relied and that the Commission had not adequately explained why it decided not to change the extrapolation factor in its rules.

Examination of all of these studies, however, leads to an appreciation of why the Commission was correct in not changing the extrapolation factor based upon the information before it.

As the Commission discusses in the Further Notice, in 2004 the Commission redacted and released five technical studies performed by its staff.[5] Unredacted copies later were released pursuant to the decision of the U.S. Court of Appeals and now also are in the record. None of the five FCC staff studies actually examined the path loss extrapolation factor. Rather, the studies examined technical issues such as the effect of the distance down the power line, differences in radiated field strength due to the detector function that was employed, effect of the receive antenna height, audible interference tests, and antenna polarization. Although Study 5 includes received signal strengths along different routes along a roadway, the data cannot be used to directly calculate path loss coefficient because the perpendicular distance to the power line is not disclosed. Therefore, these studies are insufficient to base adoption of the generally-applicable rule or even to calculate an extrapolation factor under the limited circumstances and with the actual data in the studies themselves.

In July, 2005, the ARRL submitted four additional technical studies for the record and characterized them as justifying changes to the extrapolation factor.[6] None of these studies would justify a change to the extrapolation factor.

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[5] **Studies 1 & 2:** *"BPL Measurements in Allentown, PA"*. Data on the Amperion BPL system and on Mainnet BPL system. **Study 3:** *"Emissions Measurements on Current Technologies Medium Voltage BPL System"*. Contains data collected on the Current Technologies BPL system in Potomac, MD. **Study 4:** *"BPL Summary After Briarcliff Manor, NY Test"*. Contains data collected on the Ambient BPL system in Briarcliff, NY. **Study 5:** *"BPL Emission Test Near Raleigh, NC"*. Contains data collected on the Amperion/Progress Energy BPL system in Raleigh, NC.

[6] See ARRL, ex parte, Citation of Additional Authority, ET Docket 04-37 at pp. 4-8 (filed on July 8, 2005). The studies submitted are: (1) OFCOM (United Kingdom's Office of Communications), Ascom PLT Measurements in Winchester (May 11, 2005); OFCOM, DS2 PLT Measurements in Crieff (May 11, 2005). OFCOM, Amperion PLT Measurements in Crieff (May 11, 2005); and CISPR (Special International Committee on Radio Interference)

The OFCOM studies were all conducted in the United Kingdom, where the architecture of power distribution is different from that in the United States. The ARRL failed to discuss and correlate how the differences in these foreign systems might impact the measurements being taken and how, or why, such measurements might be relevant to using BPL on power distribution systems in the United States. In addition, the three studies performed by OFCOM all used a peak detector instead of a quasi-peak detector, which could have led to anomalies resulting from high signal burst levels. In addition, all of the distances given were horizontal, not the slant range prescribed by the Commission. Use of horizontal distance rather than the slant range distance tends to provide a higher limit for radiated field strength, especially at distances below 10 meters. Later studies using the slant range distance, such as the 2007 NTIA Study discussed below, provide a closer alignment between the 40 dB/decade path loss extrapolation factor and actual measured data in the near field of the radiator.

With regard to OFCOM's specific studies, its *Ascom PLT Measurements* study describes measurements at 5 distances but only at three frequencies, all of which were below 9 MHz. In addition, there was a significant level of noise present in the measured values, particularly at distances of 10 and more meters.

OFCOM's *DS2 PLT Measurements* study does not disclose the precise distances between the antenna and the underground wires, and hence the path loss extrapolation factor cannot be determined from the study. While some measurements were taken at distances of 1 and 3 meters from the wall of some customers' residences, the data is too little to draw any valid general conclusions.

18-2 Amd2 standard (1996), "Part 2: Methods of measurement and procedure for determining limits, Amendment 2: Radio interference characteristics for overhead power lines and high-voltage equipment".

With regard to OFCOM's *Amperion PLT Measurements* study, only two measurement points below 30 meters, at 10 and 30 meters, were used. This is insufficient data upon which to rely for any general conclusions. In addition, the study does not disclose the height at the center of the loop antenna used to measure magnetic field strengths (it should have been kept at 1 meter above ground). In addition, the wide discrepancy between the magnetic field strength pass loss extrapolation figures and electric field strength path loss extrapolation figures raises doubt about their validity. The magnetic field measurements at 300 meters were very close to the system noise floor, especially above 24 MHz, and at some frequencies such as 21-23 MHz there was additional interference from 13 meter AM band transmitters that may have made the data unreliable and difficult to analyze. Similarly, the electric field measurements in the 19-28 MHz range were fairly noisy, even at the relatively short 10 meter measurement distance. The 10 meter to 30 meter regression (Electric Field Regression Chart) demonstrates fluctuations of as much as 15 dB in the 19.5-24 MHz range, making an estimate of path loss coefficient very uncertain.

A 1996 CISPR standard also was submitted by the ARRL, citing in particular Figure 17 from the CISPR 18-2 amd2 (1996) standard. Figure 17 shows the magnetic and electric field strength levels for radiated emissions from a high power converter station that employs elements such as mercury arc and thyristor tubes as a function of frequency and horizontal distance from the station. The results of the study are not validly applied to general rules to govern BPL, however, because the nature of the line-source radiation from power lines carrying access BPL signals is quite different from the radiation by high voltage power converter stations. Moreover, the model employed in figure 17 makes various assumptions that are not fully explained, and the formulas used to generate the electric and magnetic field strength values are not provided in the

CISPR 18-2 standard. In any event, the results indicate that the pass loss exponent varies from as little as 19 dB/decade to as high as 66 dB/decade, so the figure actually does not support ARRL's argument that the pass loss coefficient is less than 40 dB/decade.

Recent Studies, Including the NTIA Phase 2 Study, Support the Commission's 40 dB/decade Rule

In 2007 the National Telecommunications and Information Administration (NTIA) completed and released Phase 2 of its Study of BPL radiation.[7] NTIA modeled the effects of the FCC's rule using the same advanced computer simulation modeling software (NEC4) that is widely utilized for radiation studies by industry and government. It employed the slant range distance between a measurement antenna properly place 1 meter above ground and an overhead power line 12 meters above ground. As the Commission notes in the Further Notice, the NTIA Phase 2 study clearly demonstrates that 40 dB/decade extrapolation factor is the correct value at or above 10 MHz, and much closer below 10 MHz than figures used in the studies submitted by the ARRL discussed above.

Similarly, as the FCC also notes, a recent study from Brazil reaches the same conclusion: attenuation of emissions from BPL generally are equal or greater than the 40 dB/decade extrapolation factor used in the Commission's current rules.[8]

Adding to the recent confirmatory studies is a recent one from the Communications Research Center in Canada.[9] The study concludes that the path loss coefficient is 36 dB/decade at a measurement frequency of 37.8 MHz with the shadowing standard deviation of 3.28 dB.

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7 *See* NTIA Report 08-450, *Potential Interference from Broadband Over Power Line (BPL) Systems to Federal Government Radiocommunication Systems at 1.7-80 MHz Phase 2 Study*, NTIA, U.S. Department of Commerce (October, 2007), http://www.ntia.doc.gov/osmhome/reports.html (last viewed September 21, 2009).

8 *See* Further Notice at ¶ 34.

Conclusion

The most recent studies applying the Commission's current measurement rule clearly support an extrapolation factor of 40 dB used with slant range measurements. NTIA's Phase 2 study demonstrates that 40 dB/decade extrapolation factor is correct, and that using a lower path loss extrapolation factor is unjustified and unneeded to protect licensed communications from interference. Independent studies, including ones by the Communication Research Center in Ottawa, Canada, and the Brazil study empirically validate the continued use of the 40 dB/decade extrapolation factor.

The studies cited by the ARRL have either insufficient data or anomalies in testing and do not validate an extrapolation factor different than 40 dB/decade. Reducing the extrapolation factor based on such studies with incomplete or conflicting data would, without justification, adopt a rule that would not be empirically validated and undermine the efforts of the nascent BPL industry.

Intellon Corporation therefore requests that the Commission not change its current rule and continue to permit use of the 40 dB per decade extrapolation factor under same conditions that have applied for many years.

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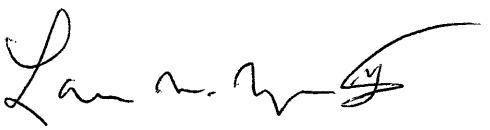
[9] *See* Jeffrey A. Pugh, Robert J. C. Bultitude, and Philip J. Vigeron, *Path Loss Measurements With Low Antennas For Segmented Wideband Communication at VHF*, Communications Research Center, Ottawa, available at http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=4086379 (last viewed September 21, 2009).

Respectfully Submitted,



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